mains elusive. It fortunately remains—as Argilés and Mourad rightly point out—a topic for further interesting and challenging studies.

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# Arteriovenous fistula adequacy

**To the Editor:** We were distressed by the conclusions of the recently published paper by Miller et al, "Predictors of adequacy of arteriovenous fistulas in hemodialysis patients" [1]. These authors defined an adequate arteriovenous (AV) fistula as the ability to use it for hemodialysis with two needles and a blood flow of at least 350 mL/min on at least six dialysis sessions in one month. Using that definition, they drew the conclusion that only 46.5% of fistulas develop sufficiently to be useful. They also noted that the adequacy rate was lower in older patients and those with diabetes.

We believe that there are two problems with the conclusions drawn by these workers.

First, this definition of AV fistula adequacy is arbitrary, although it has been used by others [2]. By increasing the duration of dialysis, it is often possible to achieve adequate dialysis clearance at blood flows less than 350 mL/min. This study does not report information on clearance or dialysis adequacy in any of the patients. If one expects to achieve successful dialysis with arteriovenous fistulae, it may be necessary to accept lower flow rates with the use of longer dialysis times.

A second concern with this study is the failure to address the possibility of salvaging inadequate fistulae. Beathard et al [2] indicate a significant rate of salvage for inadequately functioning radiocephalic AV fistulae using radiographic investigation and further intervention. Beathard and colleagues note a substantial rate of long-term functional patency after such interventions in AV fistulae.



We would also note that in our experience the use of brachial AV fistulae is associated with a substantial incidence of hand ischemia, particularly in diabetic patients. A policy of using primary brachial AV fistulae in women, diabetics, and older patients as suggested by Miller et al might produce significant complication rates.

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### Reply from the authors

We thank Drs. Hirsch and Jindal for their thoughtful response to our publication [1].

First, our definition of AV fistula adequacy was not totally arbitrary, but rather based on our ability to provide adequate dialysis in a reasonable period of time. For many of our patients it was not possible to deliver the minimal Kt/V of 1.2 (as recommended by the NKF-DOQI guidelines), with a dialysis blood flow of 200 to 300 mL/min, unless the dialysis time was increased substantially. At our dialysis units, it is challenging to convince many of our patients to dialyze longer than 3.5 hours, and exceedingly difficult to get them to stay longer than 4 hours. Thus, settling for a low blood flow in a marginal fistula in a patient who won't dialyze longer would mean settling for suboptimal dialysis.

Second, Beathard's study evaluated the outcomes only for those fistulas that were referred for evaluation. There is no indication of how many fistulas clotted early before a diagnostic workup could be initiated or what proportion of poorly developed fistulas was referred for an evaluation. Moreover, 8 of 71 patients who were referred underwent no further evaluation because of an inadequate inflow. Thus, it is likely that if one considers all fistulas that were placed, the salvage rate would have been considerably lower than that reported for the selected population. In contrast, our study evaluated prospectively the outcome of every fistula that was constructed. Specifically, of 50 consecutive forearm fistulas that were placed, 33 were inadequate. These included 14 which clotted within a few weeks of their placement. The other 19 fistulas remained patent but failed to mature adequately. Ten of these patients underwent a diagnostic ultrasound or fistulogram study. In seven cases an unsuspected stenosis or occlusion of the draining vein